REMARKS

Claims 1-32 are pending, claims 1, 2, 4-9, 11, and 16-32 having been amended by way of the present amendment. For the Examiner's convenience, responses herein have been numbered to correspond to the appropriate rejection in the Office Action. It should be noted that the correct Attorney Docket No. for this application is "77670/593."

Numbering of Claims

[3] The highest numbered patent claim is claim 16. In the reissue preliminary amendment, claims added were mistakenly numbered beginning with claim 19, rather than claim 17. Accordingly, claims 19-34 have been amended to correctly number 17-32 in accordance with 37 C.F.R. 1.173(e).

Information Disclosure Statement

[6] In accordance with the Examiner's request, submitted herewith are an Information Disclosure Statement and a PTO/SB/08a Form citing all the references that were cited during original prosecution of the patent. No fees are believed due.

[7] Applicants certify that the English translation submitted with the reference cited in the Information Disclosure Statement of May 14, 2002, is an English translation of the relevant parts of the reference.

Specification/Informalities

[8] Resubmitted herewith are the amendments to the specification previously presented in the reissue preliminary amendment. The amendments include brackets for deletions and underlining for additions in compliance with 37 C.F.R. 1.173(b)(1).

[9] Applicants will soon submit a Statement As to Loss of Original Patent in accordance with 37 C.F.R. 1.178(a).

[10] The title has been amended to recite "Mutant Prenyl Diphosphate Synthase."

[11] Also resubmitted herewith is a Statement to Support Filing and Submission in Accordance with 37 C.F.R. §§ 1.821-1.825, certifying that the paper copy and the computer readable copy of the previously submitted sequence listing, filed January 7, 2002, do not introduce new matter and are the same.

Claim Objections

[13] Claim 1 has been amended to replace the grammatically incorrect term "positions," with "position."

[14] Claims 8, 9, 24, and 25 has been amended to replace "SEQ ID No:1" with "SEQ ID NO:1."

[15] Applicants traverse the Examiner's assertion that claims 24 and 25 are substantial duplicates of claims 8 and 9. Claims 24 and 25 recite mutations of "isoleucine at position 84;" whereas, claims 8 and 9, as amended, do not. Claim 1, from which claims 8 and 9 depend, recites "X_3 and X_4 are each optionally independently present in the aspartic acid rich domain;" whereas, claim 17, from which claims 24 and 25 depend, does not. Hence, the claims' scopes are different and, therefore, the claims are not substantial duplicates.

[16] Claim 16 has been amended to correct the multiple dependencies.

[17] Claim 17 has been amended to add "at" to correct a grammatical error.

112, 2nd Paragraph, Rejections

[18a] Applicants traverse the Examiner's assertion that there is no indication that the mutant enzyme has the ability to produce a shorter prenyl diphosphate than the wild-type enzyme. Claims 1 and 17 clearly recite that this is so. Therefore, Applicants submit that there is no indefiniteness in the claim language.

For the Examiner's understanding, in Fig. 3, the main spot provided by the wild type enzyme SacGGPS corresponds to GGOH, while the main spots provided by the mutant enzymes correspond to FOH. The FOH is shorter than the GGOH. The issue is the product selectivity or specificity of enzyme reaction. The selectivity or specificity is relative, not absolute. As such, the "prenyl diphosphate" is a generic (upper) concept covering GF diphosphate, GG diphosphate, F diphosphate, and G diphosphate.

[18b] For the Examiner's understanding, the phrase "an amino acid between D_1 and the amino acid residue at the fifth position upstream of D_1" refers to between and not including.

[18c] The term "region II" in claims 1 and 17 is a well-known term of art, such that a person of ordinary skill in the art would understand it. For the Examiner's understanding, as

shown in Fig. 1, when various prenyl diphosphate synthases are aligned, some homologous regions may be contained therein. Region II is the second region with high amino acid sequence homology between various prenyl diphosphate synthases.

[18d] Claims 1 and 17 has been amended to replace the phrase "wild-type enzyme" with "wild-type prenyl diphosphate synthase" for clarification.

[18e] Claims 2 and 18 have been amended to clarify the language regarding enzymatic activity.

[18f] Claim 4 has been amended to replace the phrase "of the homodimer-type" with "a homodimer" for clarification.

[18g] Claims 5, 6, 21, and 22 have been amended to replace the term "derived from" with "is." For the Examiner's understanding, the prenyl diphosphate synthase of claim 5, for example, may be originally isolated from archaea and industrially produced by, for example, a recombinant host cell, *E. coli*. It should be noted that an interferon first isolated from a human that may be industrially produced by, for example, recombinant host, *E. coli*, may still be called "human interferon" in the art.

[18h] Claims 7 and 23 have been amended to clarify the term "thermostable." According to Fig. 2, the mutant enzymes are more thermostable compared to the wild enzyme.

112, 1st Paragraph, Rejections

[19] Claims 1 and 17 have been amended to recite a shorter "farnesyl" diphosphate.

[20] Claim 17 has been amended to cancel the language "and X_2 and X_3 are each optionally independently present in the aspartic acid rich domain."

[21] Applicants traverse the assertion that the specification does not provide sufficient written description of all species of the claimed genus of mutant prenyl diphosphate synthases. The Examiner relies on *Regents U. California v. Eli Lilly*, 43 USPQ 2d 1398 (Fed. Cir. 1997) to support the assertion. Applicants submit that the assertion is erroneous for the following reasons.

The Examiner's reliance on *Regents* with respect to claims 1-10 and 17-26 is misplaced. *Regents* held that a written description of a **DNA** requires a precise definition, such as by structure, formula, chemical name, or physical properties. There is no such holding regarding a **synthases**, as recited in claims 1-10 and 17-26.

Furthermore, the five mutants, as disclosed, are representative of the genus of mutant prenyl diphosphate synthases such that a person skilled in the art would be able to reconstruct any mutant synthase from the five examples.

Claims 11 and 27 have been amended, rendering the rejections to claims 11-16 and 27-32 moot.

[22] Applicants traverse the assertion that the specification does not provide adequate teaching such that a person skilled in the art would have to perform undue experimentation in order to arrive at the claimed mutant synthases, the encoding DNA and RNA, the host organism, and the processes.

The five mutant examples are representative of the genus of mutant prenyl diphosphate synthases, such that a person skilled in the art could predict from the five mutant examples other claimed mutants. As such, undue experimentation would not be necessary.

Claims 11 and 27 have been amended as described above in item [21], rendering the rejections to claims 11-16 and 27-32 moot.

CONCLUSION

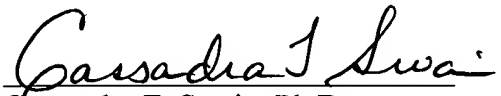
The claims are believed to be allowable.

The Examiner is invited to contact the undersigned to discuss any issues related to this application.

The Commissioner is authorized to charge any fees or credit any overpayment regarding this application to Kenyon & Kenyon Deposit Account No. 11-0600.

Respectfully submitted,

Date: March 18, 2005



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